PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
100240 PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP 00/ 06340	05/07/2000	05/07/1999
Applicant		
ELOPAK SYSTEMS AG		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[ ] the text is approved as submitted by the applicant.

[X] the text has been established by this Authority to read as follows:

SYSTEM FOR MOVING SHEET MATERIAL

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

[X] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

[ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 00/06340

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65H20/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 881 063 A (SHIKOKU KAKOKI CO LTD) 2 December 1998 (1998-12-02) column 8, line 24 - line 33 column 8, line 54 -column 9, line 11; figures	1,7
A	US 4 106 261 A (GREENAWALT EDDIE LEE) 15 August 1978 (1978-08-15) column 3, line 3 - line 12	1,7
A	US 4 869 048 A (BOECKMANN HUGO) 26 September 1989 (1989-09-26) column 5, line 30 - line 37; figures	1,7
A	WO 89 00949 A (ROVEL SARL) 9 February 1989 (1989-02-09)	

☐ Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2000	18/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Haaken, W

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/ 00/06340

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0881063 A	02-12-1998	JP 10329802 A	15-12-1998
		US 6079188 A	27-06-2000
US 4106261 A	15-08-1978	AU 526217 B	23-12-1982
		AU 3841778 A	31-01-1980
		BE 869568 A	07-02-1979
		CA 1070604 A	29-01-1980
		DE 2834392 A	15-02-1979
		FR 2399949 A	09-03-1979
		GB 2002289 A,B	21-02-1979
		JP 1283208 C	27-09-1985
		JP 54040788 A	30-03-1979
		JP 59046843 B	15-11-1984
		NL 7808175 A,B,	12-02-1979
US 4869048 A	26-09-1989	US 4790126 A	13-12-1988
		AU 2584488 A	15-06-1989
		CA 1330753 A	19-07-1994
		EP 0319995 A	14-06-1989
		JP 1167007 A	30-06-1989
		CA 1281628 A	19-03-1991
		DE 3810554 A	12-01-1989
		GB 2206556 A,B	11-01-1989
WO 8900949 A	09-02-1989	BR 8707830 A	31-10-1989
		DE 3751786 D	30-05-1996
		EP 0324739 A	26-07-1989
		JP 2500019 T	11-01-1990

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
100240 PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/06340	05/07/2000	05/07/1999
International Patent Classification (IPC) or national classification and IPC B65H20/18		
Applicant ELOPAK SYSTEMS AG et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
19/12/2000	20.09.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Spitzer, B Telephone No. +49 89 2399 7501

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/06340

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-8 as originally filed

Claims, No.:

1-19 as originally filed

Drawings, sheets:

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	4-8,11-14
	No:	Claims	1-3,9,10,15-18
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-18
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Reference is made to the following documents:

D1: EP-A-0 881 063 (SHIKOKU KAKOKI CO LTD) 2 December 1998

D2: US-A-4 106 261 (GREENAWALT EDDIE LEE) 15 August 1978

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Independent Claim 1

1.1 The document D1 discloses all the features of present claim 1, namely (the references in parentheses applying to this document):
"Apparatus(c. 1, l. 5-6), comprising first clamp means for indexing sheet material (Fig. 1: 7) through forming means (Fig. 1: 14) of said sheet material (Fig. 1: 1), further clamp means (Fig. 1: 9) for indexing said sheet material (Fig. 1: 1) toward said first clamp means (Fig. 1: 7) substantially synchronously with said first clamp means, characterized in that, said first clamp means (Fig. 1: 7) and/or said further clamp means (Fig. 1: 9) are coupled to non-mechanical control means (Fig. 1: 23)."

1.2 Therefore, the subject-matter of claim 1 does not satisfy the criterion set forth in Article 33(2)PCT.

1.3 Document D2 substantially discloses the same subject-matter and therefore is also novelly-destroying.

2. Dependent Claims 2 to 7 and 9 to 13

2.1 The additional features of claims 2 to 7 and 9 to 13 do not contribute to novelty and/or inventive step for the following reasons:

2.2 The additional features of claims 2 and 10 are already known from D1 (c. 6, l. 16).

2.3 The additional features of claim 3 are already known from D1 (Fig. 1: 7).

2.4 The additional features of claim 4 are already known from D2 (Fig. 1: 24, 26; c. 2, l. 54-56).

2.5 The additional features of claims 5, 6, 7, 11, 12, and 13 are a normal design option.

2.6 For claim 9 the same objections as for claim 9 are raised.

3. Independent Claim 8

3. Claim 8 substantially discloses the same subject-matter as claims 1 and 4 (see

point 12 below) therefore, claim 8 does not satisfy the criterion set forth in Article 33(2)PCT.

4. Independent Claim 14

4.1 The subject-matter of claim 14, i.e. a "normal" container, is generally known in the art. Therefore, the subject-matter of claim 1 does not satisfy the criterion set forth in Article 33(2)PCT.

4.2 Furthermore, claim 1 and 18 are not so linked as to form a single general inventive concept (Rule 13.1 PCT) because there are no corresponding special technical features.

4.3 In case an amended claim 1 would fulfill the requirements of Article 33(1) PCT the applicant should have been redrafted claim 14 as a use claim, e.g.: " Use of an apparatus according to claim 1 for manufacturing a container, comprising....".

5. Dependent Claims 15 to 17

5.1 Dependent claims 15 to 17 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the EPC with respect to novelty because the additional features of claims 15 to 17 are generally known.

6. Independent Claim 18

6.1 The document D1 discloses all the features of present claim 18, namely (the references in parentheses applying to this document):
"Method (c. 1, l. 6-7), comprising indexing sheet material through forming means (Fig. 1: 14) of said sheet material (Fig. 1: 1), characterized by controlling indexing (Fig. 1: 23) of first portions of said sheet material independently of second portions of said sheet material (Fig. 6: 16 and 26)."

6.2 Therefore, the subject-matter of claim 1 does not satisfy the criterion set forth in Article 33(2)PCT.

6.3 Document D2 substantially discloses the same subject-matter and therefore is also novelly-destroying.

Re Item VII

Certain defects in the international application

7. In order to meet the requirements of Rule 27(1)(b) EPC, the applicant should have

identified as such the document representing the closest state of the art and should have discussed briefly the relevant background art disclosed therein. (Rule 5.1(a)(ii) PCT).

8. The features of the claims 8, 9, 18, and 19 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

9. Reference number 12a is missing in Fig. 1. The right roller 12 should have been numbered as 12a. Reference numbers 91, 92 and 96 are mixed up (see description p. 6, the two last paragraphs and Fig. 1 to 5 and the corresponding claims). On page 7, 1st, 3rd and 4th paragraphs the reference number for the third motor is wrong: 64 instead of 100 (see Figures).

10. The expression "c.c. motor" used in the description on page 5, 3rd paragraph should have been explained.

Re Item VIII

Certain observations on the international application

11. Claims 1, 8, and 18 lack clarity (Art. 6 PCT) because the term "indexing" is not clear. An expression corresponding to the term "avanzare" as used in the Italian priority document, like e.g. "transferring" (p. 1, l. 1) or "advancing" (p. 1, 2nd para.), should have been used.

12. Although claims 1 and 8 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

    Hence, claims 1 and 8 do not meet the requirements of Article 6 PCT.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/06340

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65H20/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 881 063 A (SHIKOKU KAKOKI CO LTD) 2 December 1998 (1998-12-02) column 8, line 24 - line 33 column 8, line 64 -column 9, line 11; figures	1,7
A	US 4 106 261 A (GREENAWALT EDDIE LEE) 15 August 1978 (1978-08-15) column 3, line 3 - line 12	1,7
A	US 4 869 048 A (BOECKMANN HUGO) 26 September 1989 (1989-09-26) column 5, line 30 - line 37; figures	1,7
A	WO 89 00949 A (ROVEL SARL) 9 February 1989 (1989-02-09)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2000	18/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Haaken, W

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int'l Application No
PCT/EP 00/06340

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0881063	A	02-12-1998	JP 10329802	A	15-12-1998
			US 6079188	A	27-06-2000
US 4106261	A	15-08-1978	AU 526217	B	23-12-1982
			AU 3841778	A	31-01-1980
			BE 869568	A	07-02-1979
			CA 1070604	A	29-01-1980
			DE 2834392	A	15-02-1979
			FR 2399949	A	09-03-1979
			GB 2002289	A,B	21-02-1979
			JP 1283208	C	27-09-1985
			JP 54040788	A	30-03-1979
			JP 59046843	B	15-11-1984
			NL 7808175	A,B,	12-02-1979
US 4869048	A	26-09-1989	US 4790126	A	13-12-1988
			AU 2584488	A	15-06-1989
			CA 1330753	A	19-07-1994
			EP 0319995	A	14-06-1989
			JP 1167007	A	30-06-1989
			CA 1281628	A	19-03-1991
			DE 3810554	A	12-01-1989
			GB 2206556	A,B	11-01-1989
WO 8900949	A	09-02-1989	BR 8707830	A	31-10-1989
			DE 3751786	D	30-05-1996
			EP 0324739	A	26-07-1989
			JP 2500019	T	11-01-1990

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
11 January 2001 (11.01.2001)

PCT

(10) International Publication Number
WO 01/02276 A1

(51) International Patent Classification[7]: B65H 20/18

(21) International Application Number: PCT/EP00/06340

(22) International Filing Date: 5 July 2000 (05.07.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
MO99A000146 5 July 1999 (05.07.1999) IT

(71) Applicant *(for all designated States except US)*: ELOPAK SYSTEMS AG [CH/CH]; Cherstrasse 4, CH-8152 Glattbrugg (CH).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: BIANCHINI, Alessandro [IT/IT]; Via dei Traeri, 54, I-41010 Cognento (IT). DI GRANDE, Sal [US/US]; 4341 Beau Rivage, Lutz, FL 33549 (US).

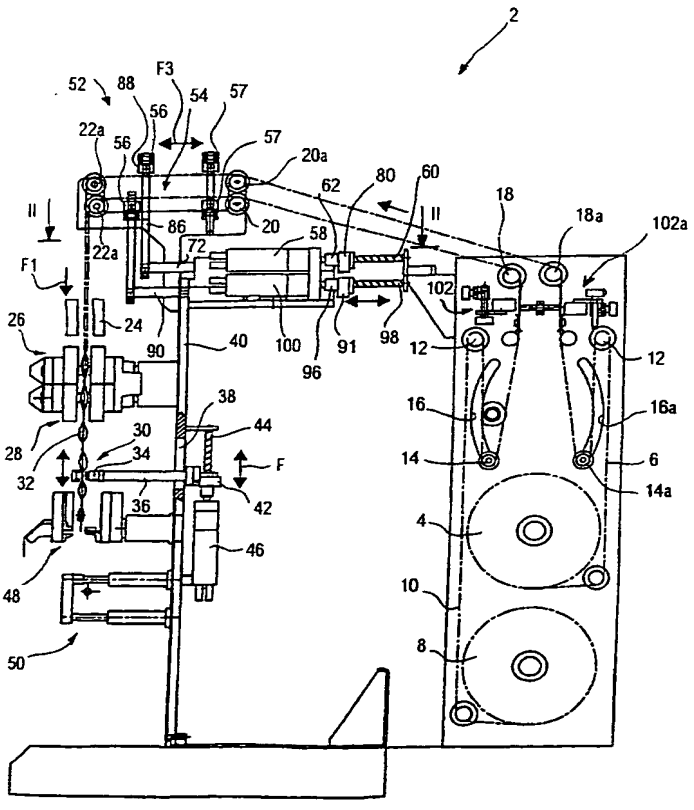
(74) Agent: LUPPI, Luigi; Luppi & Crugnola S.R.L., Viale Carassori, 54, I-41100 Modena (IT).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SYSTEM FOR MOVING SHEET MATERIAL



(57) Abstract: An apparatus (2) comprises: first clamp means (30) for indexing sheet material (6, 10) through its own forming means (24, 26, 28), further clamp means (52; 54) for advancing said sheet material (6; 10) towards said first clamp means (30) synchronously; the first clamp means (30) and/or the further clamp means (52; 54) are coupled to electronic control means and are mechanically disconnected to each other; a method comprises: indexing sheet material (6, 10) through its own forming means (24, 26, 28) by acting on a region of said sheet material (6; 10), controlling said advancing by acting on a further region of said sheet material (6, 10) disposed upstream said region; said advancing and said controlling take place by using electronic auxiliary means; a container comprises first and second wall means connected to each other along a peripheral sealing (130) in order to define an internal space (132) and regions (104, 110) positioned in a pre-established manner on faces (106, 112) of said wall means.

WO 01/02276 A1

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

system for moving sheet material

The invention relates to method and apparatus for transferring and positioning sheet material, as well as a container manufactured from sheet material.

Prior art comprises blow-thermoforming machines in which sheet material is unwound from a single reel, or from a pair of reels, placed side by side, and is indexed through at least one pre-heating station, at least one sealing station and at least one forming station.

In the at least one pre-heating station the sheet material is advanced between heating plates which increase the temperature of the sheet material substantially up to the softening temperature and prepare the sheet material to thermoforming; in the at least one sealing station sealing mould elements join together opposing strip portions of sheet material along outlines of at least one row of container preforms, so that in each container preform openings are formed through which a forming fluid is injectable; in the at least one forming station the forming fluid is injected into the container preforms through the above mentioned openings and expand the container preforms into hollows of at leat one forming mould, so that rows of preforms are turned into respective rows of containers.

The sheet material is indexed through the above mentioned stations by a first moving clamp disposed downstream of the at least one forming station and a second moving clamp disposed upstream of the at least one pre-heating station, the first moving clamp and the second moving clamp being mechanically coupled by a set of levers to a main driving shaft of the machine.

This implies firstly a disadvantage consisting in that, designing and manufacturing of the set of levers is complicated; furthermore, it is very difficult to modify their specific performances in use, which could be required for operational needs.

Termoformed containers formed by means of such machines

generally bear printed regions comprising wordings and/or images (for example for advertisements or adorning) which are pre-printed on the reels and thus the sheet material has to be indexed of accurate steps, in such a way as the above-mentioned printed regions are centered with respect to the at leat one sealing mould and the at least one forming mould.

Therefore, the above mentioned sets of levers show a further disadvantage consisting in that, it is difficult to vary the indexing step of the sheet material: in effect, in order to do so, it is necessary to act on mechanical elements of the sets of levers, with a remarkable waste of time and the need for qualified and expert personel.

It is still more difficult to correct the indexing step in order to subject the sheet material, in the section comprised between the first and the second clamp, to a pre-determined elongation for an amount such to adapt the printing step between two rows of consecutive marks to the advancing step of the material through the above described stations. In effect, in order to adapt the printing step to the indexing step, the second clamp are stopped against a fixed stop. Therefore a different adjustment can be carried out only by physically moving the fixed stop to a different position, which involves remarkable expenses and long preparing times.

Furthermore, the blow-thermoforming machines as above illustrated allow the positioning of only one side of the containers, which strongly restricts the aesthetic pleasantness of the containers and constitutes a remarkable obstacle to the diffusion of such containers on the market.

An object of the invention is to improve the systems for positioning of sheet material in blow-thermoforming machines.

Another object of the invention is to allow the advancing step to be adjusted in a faster and easier manner.

A further object is to simplify adjustment of the clamp in order to adapt the advancing step of the sheet material to the printing step.

According to a first aspect of the invention, there is

provided apparatus, comprising first clamp means for indexing sheet material through forming means of said sheet material, further clamp means for indexing said sheet material toward said first clamp means substantially synchronously with said first clamp means, characterized in that said first clamp means and/or said further clamp means are coupled to non-mechanical control means.

Advantageously, said non-mechanical control means comprises electronic control means.

Owing to this aspect of the invention, there is no need for mechanical coupling between the first clamp means and the further clamp means.

This greatly simplify manufacturing of the machine and adjustment of the stroke of the first and/or further clamp means.

According to a second aspect of the invention, there is provided apparatus, comprising first clamp means downstream of forming means for indexing first sheet material and second sheet material joined together by said forming means, second clamp means upstream of said forming means for indexing said first sheet material toward said first clamp means substantially synchronously with said first clamp means, characterized in that, third clamp means are provided upstream of said forming means for indexing said second sheet material toward said first clamp means substantially synchronously with said first clamp means.

Thus, printed regions can be centered on both sides of the container.

Owning to these aspects of the invention, adjustment of the indexing step of sheet material through a blow-thermoforming machine is remarkably easier because complex mechanical connections of the clamps are avoided.

According to a third aspect of the invention, there is provided a container, comprising first and second wall means joined together along a peripheral seal and defining an internal cavity, characterized in that, regions of said wall

means extend over pre-determined positions of said first and second wall means.

According to a fourth aspect of the invention, there is provided a method, comprising indexing sheet material through forming means of said sheet material, characterized by controlling indexing of first portions of said sheet material independently of second portions of said sheet material.

From the first and second portions container walls can be formed bearing printed regions.

Thus, thermoformed containers can be manufactured having printed regions on both the first and second wall means.

The invention will be better understood and carried out with reference to the accompanying drawings, which show an indicative and non-restrictive example thereof, wherein:

Figure 1 is a partially sectioned, sketched side view of a blow-thermoforming machine;

Figure 2 is a section taken along plane II-II of Figure 1;

Figure 3 is a section taken along plane III-III of Figure 2;

Figure 4 is a section taken along plane IV-IV of Figure 2;

Figure 5 is an enlarged and broken view of an upper portion of the blow-thermoforming machine of Figure 1;

Figure 6 is a front view of a container with an image printed on one of its faces;

Figure 7 is a front view of the container of Figure 6 showing another image printed on the opposite face;

Figure 8 is a sketched and broken section of the container of Figures 6 and 7 inside the forming mould.

As shown in Figure 1, a blow-thermoforming machine 2 comprises a reel 4 of sheet material 6 and a further reel 8 of further sheet material 10, equal or different from the sheet material 6. The sheet material 6, 10 is partially wound around a first idle roller 12, 12a, a tensioner roller 14, 14a moving into a curved slit 16, a second idle roller 18, 18a, third and fourth idle rollers 20, 20a, 22, 22a placed in the upper region of the machine 2.

At the exit from the fourth idle rollers 22, 22a, the sheets

6, 10 descend into the front part of the machine towards pre-heating means 24, sealing means 26 and forming means 28, at the exit of which containers 32 are obtained from the sheet material 6, 10, generally disposed along parallel rows, still joined together through non-thermoformed portions of the sheet material 6, 10.

First clamp means 30 is provided downstream of the forming means 28, comprising grasping means 34 disposed for acting on the non-thermoformed portions of the sheet material 6, 10 so as to tighten thereon, or release them, the grasping means 34 being fixed to arm means 36 vertically moving as shown by arrow F into a vertical slit 38 of a front wall 40 of the machine 2.

The arm 36 is coupled to a lead nut 42 engaged onto a screw 44 operated to rotate around its longitudinal axis by an electric motor 46 electronically controlled, for example a c.c. motor with encoder.

Through a suitable rotation of the screw 44, the first clamp means 30 can be caused to descend and lift and in particular the first clamp means 30 grasps the non-thermoformed portions of the sheet material 6, 10 when these are in their upper position and release them when these are in their lower position.

The grasp means 34 is controlled for this purpose pneumatically. This allows to index downward the sheet material 6, 10 as shown by arrow F1.

Cutting means 48 is provided downstream of the first clamp means 30 to separate the rows of containers 32 from the sheet material 6, 10 and direct them to the subsequent filling and final closing unit 50.

Second clamp means 52 is provided between the third idle rollers 20, 20a and the fourth idle rollers 22, 22a, to interact with the sheet material 6.

Third clamp means 54 are provided below the second clamp means 52 to interact with the further sheet material 10.

The second clamp means 52 and the third clamp means 54 are

provided with grasping means, generally referred to as 56, similar to the grasping means 34.

The second clamp means 52 is operated by a second electric motor 58, electronically controlled, through a second screw 60 and a second lead nut 62, while the third clamp means 54 is actuated by a third electric motor 100 electronically controlled through a third screw 98 and a third lead nut 92, as it will be shown more in detail in the following.

The second clamp means 52 and the third clamp means 54 are operated to reciprocate along an horizontal direction shown by arrow F3.

As shown in Figure 2, the second electric motor 58 is coupled to the second screw 60 through a joint 70 and the second screw 60 is supported at its ends by walls 71, 74 through respective bearings 76, 78. The second lead nut 62 is firmly joined to a cross-bar 80 connected at its first ends to a pair of rods 72 engaged to slide along their longitudinal axis into guide bodies 82 supported, through fixing means 84, to a rear portion of the front wall 40. The rods 72, at their second ends are coupled to uprights 86 interconnected at their upper side by a bar 88 carrying the grasping means 56.

As shown in Figure 3, the guide bodies 82 slidably receive, below the rods 72, a pair of further rods 90 that extend between a further cross-bar 91, firmly joined to the third lead nut 92, and further vertical rods 94, between which a further bar 95 extends carrying the grasping means 56 of the third clamp means 54.

Upstream of the second and third clamp means 52, 54 further clamp means 57 is provided, similar to the grasping means 34, 56, but supported to fixed cross-bar 97, 99 to interact separately with the sheet material 6, 10.

As shown in Figure 4, the further cross-bar 92 is fixed to a further lead nut 96 engaged on a third screw 98 operated to rotate around its own longitudinal axis by a third electronically controlled electric motor 100.

In this manner it is possible to actuate the first clamp means

30, the second clamp means 52 and the third clamp means 54 independently from each other and it is possible to adjust their stroke according to the performances desired to be obtained simply by acting on the software parameters of the control system of the respective motors 46, 58, 64.

The first electric motor determines the advancing step of the sheet material 6, 10 through pre-heating means 24, sealing means 26 and forming means 28.

The second and third electric motor 58, 64 control the adjustment of the printing step according to a sample signal marked on edge regions of the sheet material 6, 10 and detected by detector means 102, 102a.

When the detector means 102, 102a report that the mark on one or other of the strips of the sheet material 6, 10 varies with respect to the theoretic position, they send a signal to the controlling means of the second and/or the third electric motor 58, 64 in order to produce a corresponding variation of its stroke along the desired direction.

It is also possible to provide a traditional mechanical actuation for the first clamp means 30, for which the adjustment of the stroke is relatively less frequent.

Furthermore, when only the adjustment of the positioning of the sheet material 5, or 6 is required, it is possible to use only the second clamp means 52, or only the third clamp means 54 respectively, in combination with the first clamp means 30.

As shown in Figures 6 to 8, a container 32 formed by the machine 2 shows an image 104 printed on a first wall 106 so as to occupy an embossed portion 108 of the same face; the container 32 has another image 110 printed on a second wall 112 opposed to the first wall 106 so as to occupy another embossed portion 114 of the second wall 112.

The first wall 106 is opposed to the second wall 112 so as the two faces 106 and 112 can be formed by respective parts shown with 116 and 118 respectively of a forming mould 120 comprised in the forming means 28.

The walls 106, 112 of the container 32 are joined together by

a peripheral seal 130 and are concave so as to define an internal cavity 132 of the container.

The mould parts 116 and 118 shows respective hollows 122, 124 to form the container 32 and in particular the mould parts 106, 112 are provided with recesses 126, 128 for forming the embossed parts 108, 114 of the container 32.

CLAIMS

1. Apparatus, comprising first clamp means (30) for indexing sheet material (6, 10) through forming means (24, 26, 28) of said sheet material (6, 10), further clamp means (52; 54) for indexing said sheet material (6; 10) toward said first clamp means (30) substantially synchronously with said first clamp means (30), characterized in that, said first clamp means (30) and/or said further clamp means (52; 54) are coupled to non-mechanical control means.

2. Apparatus according to claim 1, wherein said non-mechanical control means comprises electronic control means.

3. Apparatus according to claim 1, or 2 wherein said further clamp means (52; 54) comprises second clamp means (52).

4. Apparatus according to any preceding claim, wherein said further clamp means (52; 54) further comprises third clamp means (54).

5. Apparatus according to any preceding claims, wherein said first clamp means and/or said further clamp means (30; 52; 54) is/are coupled to a respective electric motor (46; 58; 100) by position control means (42, 44; 60, 62, 80, 72, 86, 88; 98, 96, 91, 90, 94, 95).

6. Apparatus according to claim 5, wherein said position control means (42, 44; 60, 62, 80, 72, 86, 88; 98, 96, 91, 90, 94, 95) comprises screw means (44; 60; 98) engaged into respective lead nut means (42; 62; 96) to which support means (36; 72, 76, 88; 90, 94, 95) of respective grasping means (34; 56) is coupled.

7. Apparatus according to any preceding claims and further comprising fixed grasping means (57) disposed upstream of said further clamp means (52; 54).

8. Apparatus, comprising first clamp means downstream of forming means for indexing first sheet material and second sheet material joined together by said forming means, second clamp means upstream of said forming means for indexing said first sheet material toward said first clamp means

substantially synchronously with said first clamp means, characterized in that, third clamp means are provided upstream of said forming means for indexing said second sheet material toward said first clamp means substantially synchronously with said first clamp means.

9. Apparatus according to claim 8, wherein said first clamp means and/or said second clamp means and/or said third clamp means is coupled to non-mechanical control means.

10. Apparatus according to claim 9, wherein said non-mechanical control means comprises electronic cntrol means.

11. Apparatus according to anyone of claims 8 to 10, wherein said first clamp means and/or said second clamp means and/or said third clamp means is/are coupled to a respective electric motor (46; 58; 100) by position control means (42, 44; 60, 62, 80, 72, 86, 88; 98, 96, 91, 90, 94, 95).

12. Apparatus according to claim 11, wherein said position control means (42, 44; 60, 62, 80, 72, 86, 88; 98, 96, 91, 90, 94, 95) comprises screw means (44; 60; 98) engaged into respective lead nut means (42; 62; 96) to which support means (36; 72, 76, 88; 90, 94, 95) of respective grasping means (34; 56) is coupled.

13. Apparatus according to anyone of claims 8 to 12 and further comprising fixed grasping means (57) disposed upstream of said further clamp means (52; 54).

14. Container, comprising first and second wall means connected to each other along a peripheral seal (130) and defining an internal cavity (132), characterized in that regions of said wall means extend over pre-determined positions of said first and second wall means.

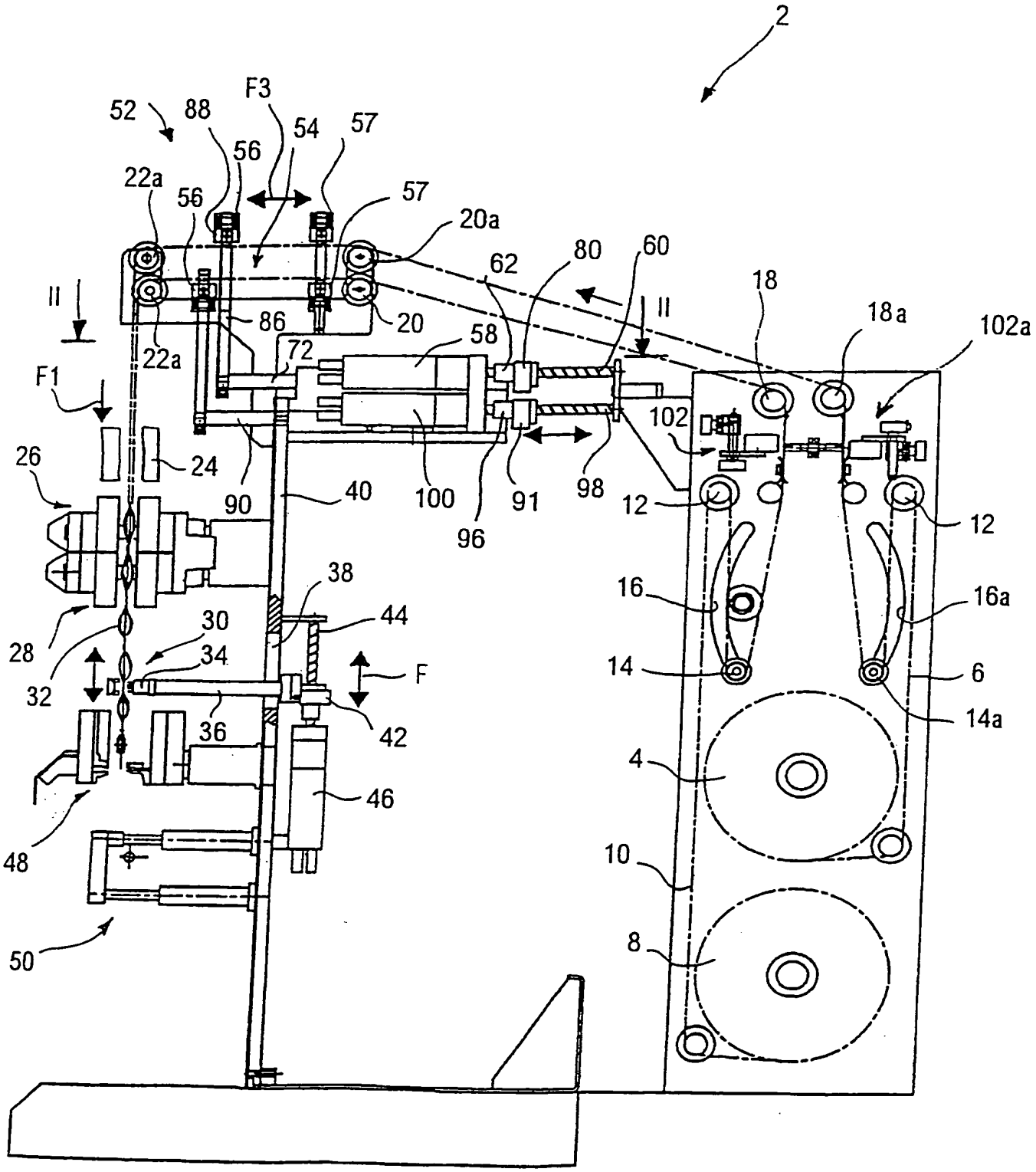
15. Container according to claim 15, wherein said first and second wall means (106, 112) are opposed to one another.

16. Container according to claim 14, or 15, wherein at least one of said regions (104; 110) is positioned on a corrugation (108; 114) of said wall means.

17. Container according to claim 16, wherein said corrugation (108, 114) comprises an embossment.

18. Method, comprising indexing sheet material through forming means of said sheet material, characterized by controlling indexing of first portions of said sheet material independently of second portions of said sheet material.

19. Method according to claim 18, and further comprising forming container walls from said first portions and said second portions.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F3
54
57
56
22a
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57
20a
62
80
60
II
18
18a
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II
86
20
58
72
22a
F1
102
26
24
90
40
100
91
98
12
12
96
38
16
16a
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4
46
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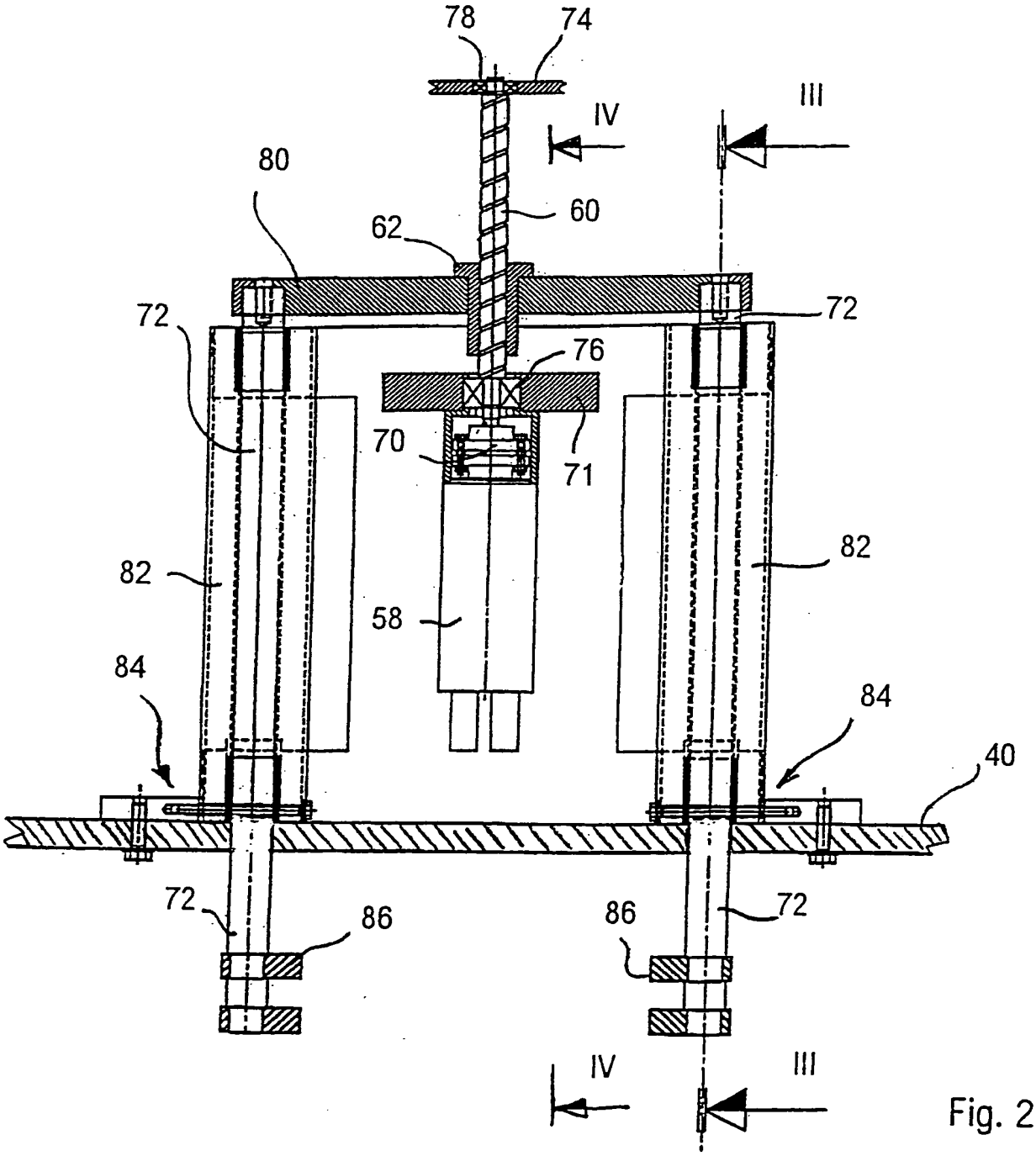
10
8
50

Fig. 1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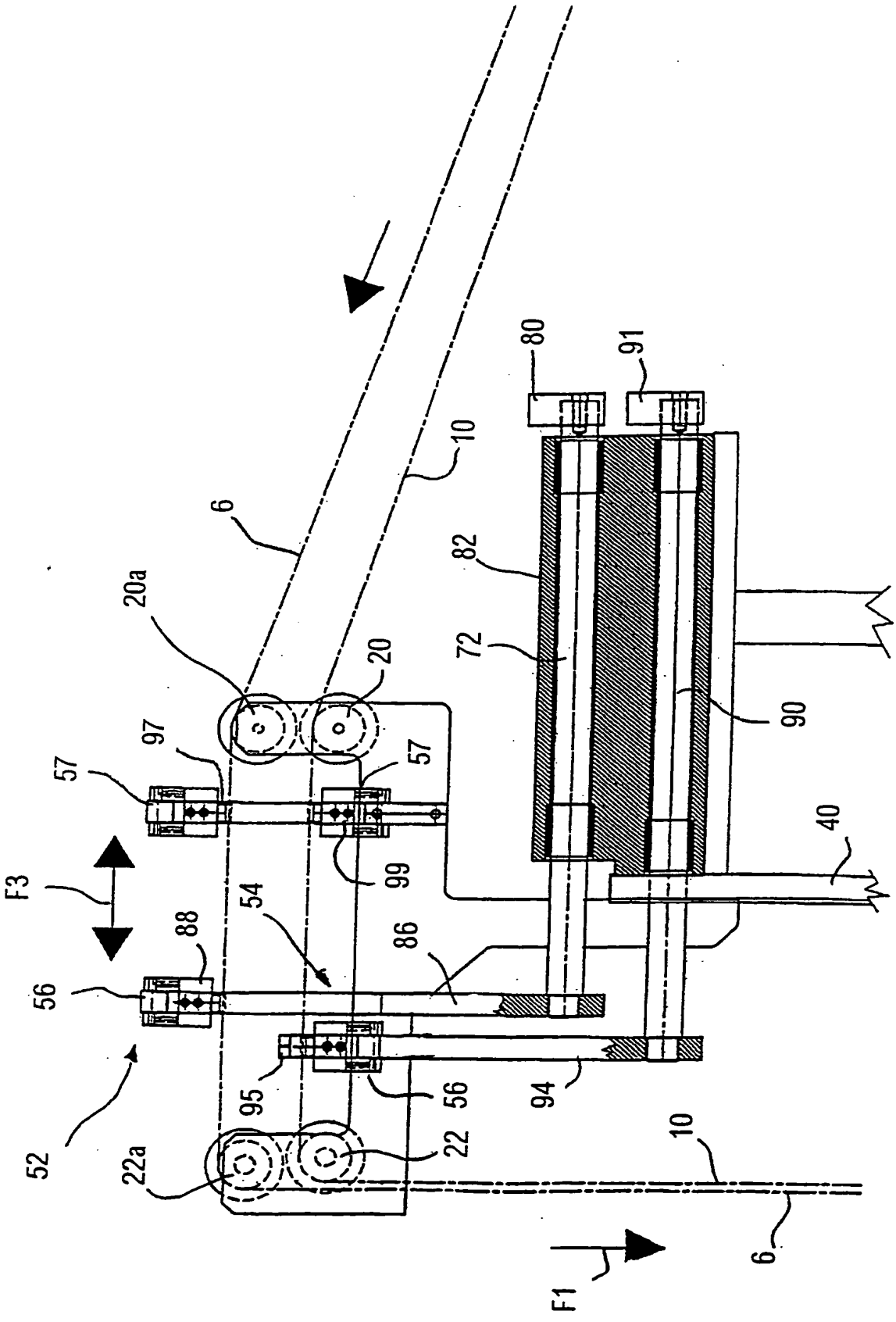
III

Fig. 2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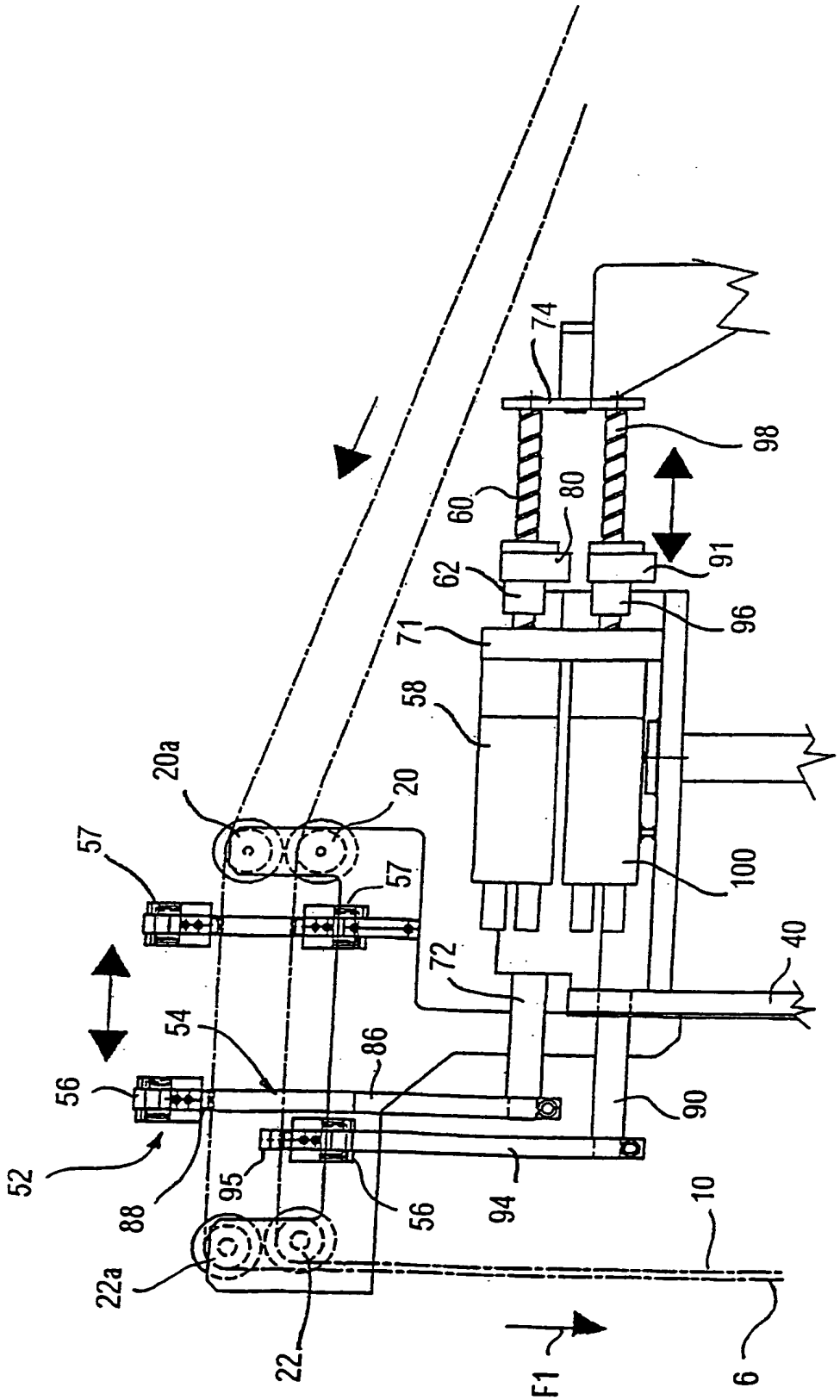
22a
6
F1

Fig. 3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22a
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F1
6

Fig. 4

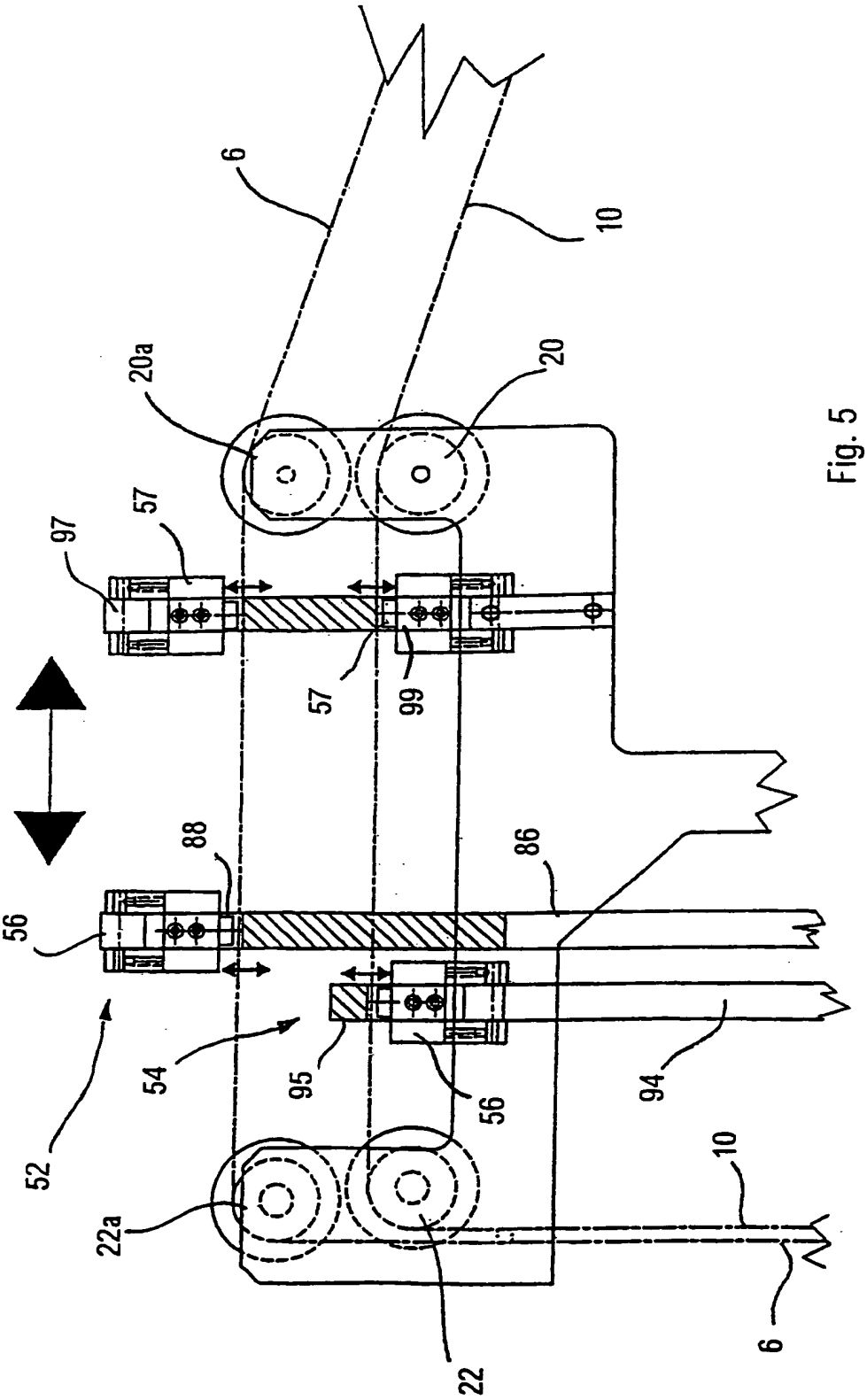

Fig. 5

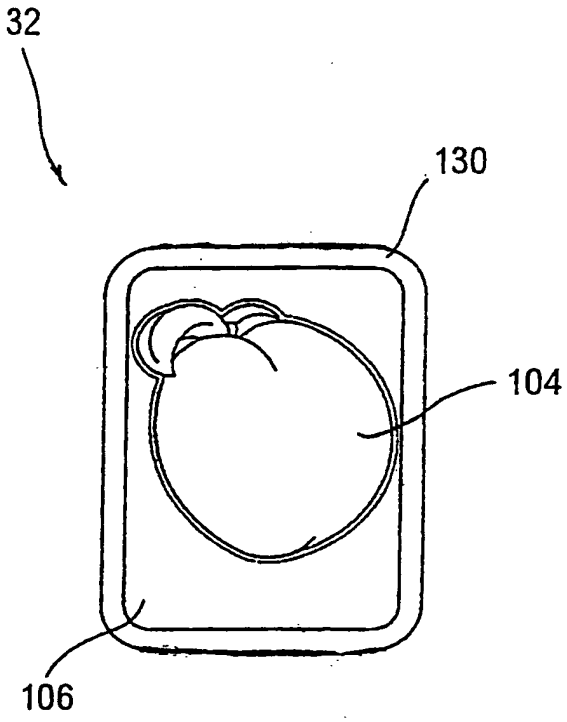

Fig. 6

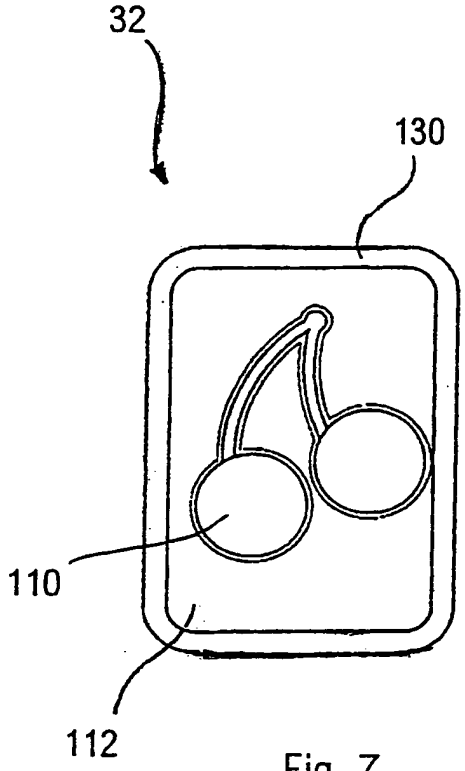

Fig. 7

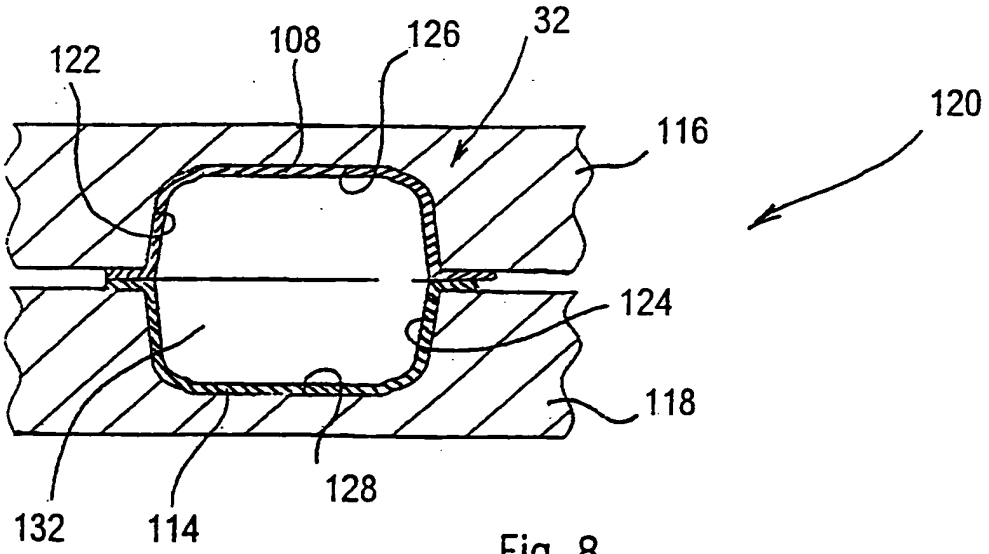

Fig. 8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/06340

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65H20/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	WO 89 00949 A (ROVEL SARL) 9 February 1989 (1989-02-09)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2000	18/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Haaken, W

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte[illegible]onal Application No
PCT/EP 00/06340

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